The Northwestern MILLER

MILLING PRODUCTION SECTION

U.S. and European Millers: Their Different Objectives

By Fred M. Atkinson

EDITOR'S NOTE: Fred M. Atkinson, chairman of the board of the Atkinson Milling Co., Minneapolis, is a veteran traveler. Wherever he goes, he seeks out millers and mill builders. His ability to size up situations and circumstances is illustrated in this article which is the text of a talk he gave to the members of District 4 of the Association of Operative Millers in Minneapolis Jan. 21.

I am supposed to be talking about the differing objectives of European millers but I do not wish to give you the impression that the differences described here are necessarily typical or even necessarily correct because the scope of my observations was limited and besides others might cover the same territory and read a different story into what they saw and heard. Also, I will probably dwell more on the parts that appealed to me than those which might not seem so attractive to me or which any of us might take for granted. There is a saying—"The truth is what we believe"—and obviously beliefs differ.

One miller that I know abroad represents the 15th generation in charge of the same milling company. This mill was fully modernized in the very recent past and is still on the same spot on which the original mill was located. As a matter of fact, I believe a part of the old foundations are still used. We, of course, cannot hope to match a record of that sort but the history behind most of their mills lends a feeling of permanence, both to the mill and to the company and management behind the mill. Milling is regarded in high degree as a way of life by both owner and employee and for many years succeeding generations have followed the trade, and many have been educated and trained in the many good milling schools or by one of the mill machinery manufacturers.

Fred M. Atkinson

The thoroughness and extent and quality of this training and education, and the facilities available for research and training in physics, chemistry, and engineering as well as milling techniques were very impressive. This is an understatement. No mill was without well trained personnel. If they were very small, they had the services of well-trained mill engineers from one of the mill machinery manufacturers. But that is getting ahead of my story. Very often the owner of the mill or a member of his family is a graduate engineer and often the head miller or superintendent, even in the larger plants. Almost always, they have traveled extensively to many countries, including the U.S., in order to see other mills and techniques, usually finding that millers in other countries are apt to be freer with information than they could generally expect at home.

If any proof were needed of the foreign millers being well traveled and acquainted with other mills, a quick glance at one of the ever present guest registers of each plant is all that is necessary. Millers from almost any country you could name have visited and studied in the larger and newer mills. The closeness of the foreign mill owner and his top management to production and technical matters is unique. Most have their offices and several even had their homes or apartments in the mill itself and very attractive homes they were, too.

Most mills have their own lunch rooms with special tables or a room for the owner, miller, superintendent, engineer, chemist, sales manager, etc. These men meet leisurely, talk shop, and have some wine or beer along with excellent food as a normal part of their day's work, a more enjoyable noon break, as far as I was concerned, than taking out 20 minutes to gulp down a sandwich or hamburger and a cup of coffee, and in addition, I think the idea is more constructive. Every place I visited, there was always a cup of coffee or tea or other refreshment as well as plenty of time for the visitor in a pleasant, quiet room. I wish that I could say our own visitors had been treated as well.

Many Small Mills

The closeness of top management to plant and production problems is just one of the reasons why the relatively small, local and independent mill seems to continue to prevail in Europe to a greater extent than in North America. There are literally thousands of mills in Western Germany, for example, and due to technical aid and advice from the efficient service staffs of the all important mill builders and machinery manufacturers, the quality and uniformity of their products as well as their milling efficiency are quite comparable with that of the larger plants, located with water transportation available.

Here also, as in most other places, the grist, both as to percentage and origin of the wheats is a matter of government decision, so there is no question of special advantage in wheat to any mill due to the backing of a large grain firm. Not only this but the government controls the prices paid for the grain and makes the wheat available to all mills at the same price regardless of location throughout the whole country. This is practically without exception. Naturally, this guarantees the local market for the local miller and eases transportation problems because most mills are either on a canal, river or the ocean and the finished products are delivered within a small radius. It also makes each area more self-sufficient and provides more employment even though the overall output per man per hour may be less.

These policies seem to satisfy the government purposes as well as the people and help promote national security. Though their wage scales may be lower, hours worked longer, and their general standard of living different than ours, it seems to make milling a very attractive career. The respect in which the local miller is held as an important person to the community is typified by the pride that the community takes in their own mill and its efficiency and appearance. The opening of a new or remodeled plant is always cause for a community ceremony.

With this background in mind, competition between mills is obviously of a very different character than the type that we are supposed to enjoy over here.

Scope of Competition

Competition they do have, however, and at least in most cases, finished product prices are not fixed by the government or by cartel arrangement, and there always seems to be a very lively comparison of flour quality by the consumers of the mill's products. Laboratory control seems to have been started earlier and carried further abroad than it has here and with a greater variety of methods. Perhaps due to the uniformity of the mills' grist, there seems to be a vastly greater appreciation and knowledge of the profound effects of conditioning and milling techniques upon flour quality. Advancement along these lines also has been spurred on by the fact that quite often no oxidizing agents or flour improvers whatsoever are permissible.

A word here might also be said about the wide variety or types of baked goods that the traveler encounters and the adaptation of milling procedures in each locality to produce the flour best suited to the local baking method and public taste. There is certainly not as uniform a standard for the loaf of bread as exists in this country. The traveler from this country may find the bread of one locality more to his taste than another, whether it be the French loaf, German round hearth bread or dark bread, the Swiss hard rolls or the Italian style bread. After the trip the traveler may still prefer to come back to the bread he has been used to for a steady diet. But whatever the type of bread that is locally popular, the miller makes his main effort towards producing the flour which is required by local custom. The individualization of mill and baked goods is noteworthy. The usual emphasis for bread is toward a lean formula, straight doughs, hand work, a thick crust and fresh baking with little wrapping as we know it here.

Flour granulation may vary widely from area to area. In one locality in South America they were using 5XX silk for finishing flour and in Eng-

(Continued on page 16a)

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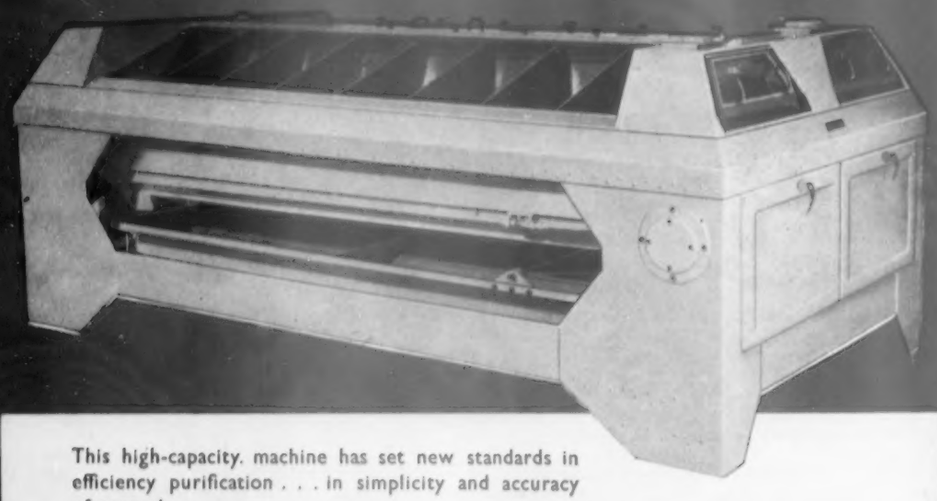

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Examination Syllabus for Flour Milling Craftsman's Certificate

How practical is an oral and practical examination to test the skill of operatives engaged in the flour milling industry of North America?

Interest in the subject was sparked by the publication of an article by E. I. Snodgrass, J. & R. Snodgrass, flour millers of Glasgow, Scotland, explaining the methods adopted under the auspices of the technical education committee of the Scottish District Council for the Flour Milling Industry. (The article appeared in this journal in January, 1956.)

One U.S. expert in technical education considers that the main difficulty of applying such examinations in North America is the rapid turnover of personnel within the industry. The British millers, he feels, are more fortunate because operatives, once settled in the industry, make it a lifetime occupation.

To take the story further, the syllabus used by the Scottish millers is now published to show how the objectives detailed by Mr. Snodgrass in his article are being carried out.

Certificate in Craftsmanship in Flour Milling

SYLLABUS OF SUBJECTS
ON WHICH CANDIDATES WILL BE EXAMINED

The subjects have been classified in nine sections. To qualify for the Certificate, the Candidate must satisfy the Examiners in each and all of the Sections I to V, and secure a total in Sections VI to IX sufficient to keep his grand total of marks for the nine sections over the pass mark (75%).

Section I

KNOWLEDGE OF WHEAT AND OF ASSOCIATED IMPURITIES

(a) **Types of Wheat**
(i) Identification of Individual Types (dirty wheat), e.g. Northern, Australian, Plate, Durum, Red Winter, Pacific Whites, Native.
(ii) Knowledge of basis on which Canadian Wheats are graded. (30 marks)

(b) **Assessment of Merchant Wheat**
(as received at Mill Intake)
Ability to assess condition of a wheat parcel—its wholesomeness, milling value, and what it would require to bring it into a proper condition for milling. (40 marks)

(c) **Impurities—Identification and Damage resulting therefrom**
(i) **Botanical.** (Seeds, etc.)

Cockle	Maize
Bindweed	Oats
(Buck Wheat)	Barley
Smut	Rye
Garlic	Wild Oats
Eucalyptus	Runch
Melilot	Thistle
Rodent Dirt	Ragweed
Ergot	Bur Parsley
Stones and Mud Balls (10 marks)	Vetches
	Wild Carrot
	Goose Grass

(5 marks)

(ii) **Entomological.** (Moths, Beetles, Mites, etc.)
Moths
Flour Moth (Ephestia)
Brown House Moth (Hofmannophila)
White Shouldered House Moth (Endrosis)
Beetles
Weevils (Calandra)
Red Rust Flour Beetle (Tribolium)
Spider Beetles (Niptus and Ptinus)
Cadelle (Tenebrioides)
Meal Worm (Tenebrio)
Cockroach (Blatta)
Lesser Grain Borer (Rhizopertha)
Red Rust Grain Beetle (Laemophlaeus)
Larvae
Flour Moth
Meal Worm
Red Rust Beetle
Cadelle
Others
Flour Mites (Tyroglyphus)
Silver Fish (Lepisina)
(15 marks)

NOTE—Technical names are included for reference and to establish identity. Candidates are not expected to know them.
It will be observed that a Candidate can secure the pass mark without an extensive knowledge of the impurities provided he can assess wheat.

Section II

ABILITY TO SET OR ADJUST ANY MACHINE IN THE MILL SO THAT IT WILL DO ITS WORK EFFICIENTLY

The Candidate must pass in each and all of the four subsections (a), (b), (c), and (d).

(a) Roller Mill (Break and Reduction). (25 marks)
(b) Purifier (Feed, Aspiration, etc.). (15 marks)
(c) Carter Discs. (10 marks)
(d) Intake Separator. (10 marks)

The examiners will select four out of the following subsections, one of which will be Sub-Section (e):
(e) Flour Packer (all operations).
(f) Washer and Whizzer.
(g) Mixer (Shoe, Jack Top, etc., but not Novadel).
(h) Carriage on Band Conveyor.
(i) Automatic Weigher.
(j) Drier and Conditioner.
(k) Bin Discharge Regulator (volume measure).
(l) Bleaching and Improving Plant.
(m) Detachers.
(n) Water-wheel Damper.
(4×10=40 marks)

Section III

COVERS, BELTS, CHOKES

(a) Reclothe a Centrifugal or Purifier. (33⅓ Marks)
NOTE—The Candidate will be asked to perform only a part of the process; sufficient to provide the Examiners with evidence of his ability.

(b) Repair a Belt and replace it on the pulleys. (33⅓ marks)
NOTE—The Candidate will be allowed to repair the belt provided in any recognized manner, but he will be expected to be familiar with lacing methods.
He may be asked to demonstrate how he would go about replacing the belt.

(c) **Procedure to be followed in clearing a choke in a Bucket Elevator, a Centrifugal, Whizzer, etc.** (33⅓ marks)
NOTE—It will not be possible, as a rule, to stage an actual choke for the examination, but the Candidate will be required to demonstrate on the site what he would do to clear the situation should it arise.

Section IV

ABILITY TO IDENTIFY MILL STOCKS

The Candidate will be asked to identify five samples, and to state the origin and destination of the Stock, i.e., he will be expected to know the Flow Sheet of his own Mill.

(a) **Screen Room** (one sample)
Machines from which stocks might be drawn—Separators, Carter Discs or Cockle Cylinders, Grinder, Brushes, Scourers, Magnets, Washer and Stoner, Effluent Recovery. (10 marks)

(b) **Grist or Mill Feed**
Ability to separate and identify the types of wheat in a grist, to estimate the relative proportions in which they are present, to assess the condition of the various types found by their behaviour on the mill, to describe their respective characteristics on the mill, and to suggest possible alternatives for them in the grist. (30 marks)

(c) **Mill Stocks** (three samples)
(i) Break Rolls (e.g., a Candidate should be able to distinguish between the feeds to II. Break and IV. Break).
(ii) Break Scalpers.
(iii) Break Graders (particularly Coarse and Fine Semolinas, Coarse and Fine Middlings, Dunst.).
(iv) Break Dusters.
(v) Purifiers (Feed, Overtails, Tail Aspirations, Tins, Throughs).
(vi) Reduction Rolls (Feeds and Grinds).
(A Candidate should be able to distinguish between the stocks of A, B, C Reductions, say, and F, K, J, or M, N, O.)
(vii) Dressing Machines.
(viii) Flour (Strong, Winter, and Biscuit).
(A Candidate should be able to recognize the type of flour by handling the sample and testing it with his spatula. He may be asked to compare two flours by making a Pekar Test of them).
(3×20=60 marks)

Section V

ABILITY TO RECOGNIZE FAULTS IN MILL STOCKS AND TO DIAGNOSE THE CAUSE

Faults may be caused by—
(a) **Damaged Covers.**
(b) **Some irregularity in Feed** (e.g., wrong component in Feed; excess or deficiency in quantity).
(c) **Incorrect adjustment** of controls of machine.
(d) **A mechanical defect** or obstruction in the machine (e.g., Break Rolls dull or newly fluted, slipping belt, throw of Plansifter, choked Distributor, etc.). (100 marks)

NOTE—The Examiner will select three samples illustrative of the above faults. These samples will be submitted to the Candidate, who will be required to diagnose the faults in them.
As in all the preceding Sections, a pass in this Section is indispensable for a Certificate.
In Sections VI to IX the Candidate is not required to gain a pass mark (75%) in any individual section, but he must obtain sufficient marks to secure a pass mark in the examination as a whole.

Section VI

KNOWLEDGE OF MILL EQUIPMENT

The Candidate will be expected to be familiar with any of the following machines, and may be asked to identify significant parts or to explain the purpose of the machine and how it works:—Sack Elevator, Bucket Elevator, Traveling Bands—Throw-off, Pulleys, Types of Screw Conveyors, Bins (measurement of contents and discharge mechanism), Automatic Weigher, Separators, Cylinders, Magnets, Grinder, Spiral Brushes, Scourer, Wheat Drier, Washer and Whizzer, Conditioner, Dust Collector — Cyclones, Scalpers, Plansifters, Agitators, Mixers and Blenders, Entoleter, Sack Cleaning, Sack Sewing Machine, Bleachers, Bran Finisher, Detacher, Water-wheel Damper, Roller Mill, Purifier, Centrifugal. (200 marks)

(Continued on page 18a)

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Extraction of Air From Wheat Seen as Key to Successful Conditioning

By JOHN SPEIGHT

EDITOR'S NOTE: John Speight is an English milling engineer who has had experience in the milling industries of both Britain and Germany. For eight years he was associated with the German milling firm of MIAG. He has written technical articles for milling publications in several countries. The current article was prompted by the report of the study on the penetration of moisture into the wheat kernel contributed by Gordon M. Grosh and Dr. Max Milner to this journal in October, 1955.

* *

The problems confronting the milling industry in regard to the movement of water in wheat is today considered to be one of the major problems facing this industry. There is no doubt that the movement of water in wheat is of vital importance alike to the research worker, the miller and the milling engineer.

The cost of turning wheat into flour can be greatly reduced if the wheat is in the best possible condition for processing. A mellow wheat will require considerably less power on the break and reduction rolls, the stocks will dress freely, there will not be the wear and tear on bolting cloths and the improvement in the quality of the flour will show itself in the financial results. Therefore, it is only natural that the miller and the milling engineer alike are very much interested in this problem of the movement of water in wheat.

In the flour milling industry the miller is generally willing to offer his help in any practical application that may help to solve any of the many problems that beset the industry, but, of course, he is a busy man and has little time to undertake tedious research involving time and money. The research worker has, therefore, to look to the milling engineer for the transition of an idea into the realm of practical application. It is the engineer who takes the idea, studies it and makes tests until he is satisfied he can obtain a reasonable approach from a practical point of view, after which he does his best to interest a miller who may be willing for tests to be carried out in his mill.

Usually years elapse between the birth of an idea and adoption by the industry, especially if the subject is one in which Nature is interested, for Nature is a very hard task master.

First Conditioning Attempts

The movement of water in wheat is in the nature of a struggle between the scientists and Nature who has been very loth to yield the secret. Many years have passed since millers and others became interested in the presence of water in wheat. How they first tried to extract surplus water and later on to inject additional water in order to soften down very hard wheats. Over 100 years ago, about the year 1850, some very hard steely types of wheat were grown in Europe which at that time were practically unsaleable owing to the fact that it was very difficult to grind them by millstone. It is recorded that one enterprising English miller thought it might be possible to grind them more easily by spraying them with water. He did this operation several times and afterwards let them lay together for a time and was greatly surprised to find he could now grind them more easily; in consequence he produced a far better type of flour than his neighbors and accordingly reaped the reward.

I think this is the first recorded attempt at conditioning wheat by a miller. Over 100 years have passed since that time, during which we have accumulated a vast store of knowledge concerning the conditioning of wheat. One of the earliest research workers in this respect was Emerich Pekar, the inventor of the simple test for flour color, bearing his name and used the world over. Pekar was a Hungarian scientist interested in flour milling, being a director of the Istvan Flour Mills in Debreczin, Hungary. At that time, around the year 1870, Hungary produced flour that was the envy of the world; her system of manufacture was far ahead of any other country. Pekar was one of the leading authorities in the industry; he studied the movement of water in wheat, traveling around the world collecting information in order to improve the quality of flour and the manufacturing processes involved, which led him to publish a book entitled "The Wheats and Flours of the World from the Point of View of Science, Consumption and Milling." Unfortunately this most exacting piece of work has been lost in the dust of ages. Much information has been obtained since that time. There is, however, much more required be-

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fore we can hope to secure the maximum benefits to be obtained from conditioning.

One of the early difficulties encountered by those interested in the movement of water in wheat was to determine the advantages to be gained by adding water. The early research worker believed the only benefit was to toughen the bran so as to secure the flour portion more easily. Another school of thought declared that adding water to wheat brought about certain chemical changes within the wheat; this, however, has been hotly debated and is open to doubt and cannot be substantiated even today.

It is generally agreed that adding water to wheat, especially hard types of wheat, is beneficial in securing an improved flour quality. This question, therefore, does not lay in advantages or disadvantages but in the movement and rate of movement inside the wheat. The movement of water in wheat has been the subject of investigation by workers for many years past, their different methods of approaching this problem illuminating its different aspects.

In a continent like Europe, where millers are compelled to use a wide variety of wheats which differ greatly in their characteristics, water absorption is receiving increased attention, which is confirmed by the fact that a number of scientists are busily engaged studying this problem. Jones and Hinton in England, Swanson and Pence in America, Haltmeier in Germany, and Ugrimoff in France have all made valuable contributions towards establishing an infallible method of measuring the movement of water inside the wheat. At present there appears to be some divergence of views on the subject.

Ugrimoff's Experiments

Ugrimoff, who has spent a considerable amount of time studying this problem, has developed what is considered an excellent technique in this respect. The wheat is damped and after a fixed time, the kernels are sectioned and exposed to iodine vapors which stain the damp starch portions various hues according to the penetration. He found that the iodine vapors colored the starch portion blue when the water content in this portion was at least 16.5%, and in this way, he was not only able to trace the movement of water, but to calculate the amount present at each stage. There is no doubt that certain factors affect the movement of water in wheat; what exactly these factors are, at present remains the subject of much speculation.

Ugrimoff established the fact that water is absorbed from the germ end of the wheat far more easily than from the beard end. According to his calculations, it took several hours for the water to penetrate through the bran into the endosperm from the beard end, and only half that time from the germ end. This valuable information led to prolonged investigation by a group of German scientists who have declared that water penetrates the interior of wheat by a series of capillary actions. This theory is based on the fact that the growing plant feeds the individual grains of wheat with nourishment through a series of capillary tubes contained both in the stalk of the growing plant and also continues right inside the wheat kernel. The natural juices that feed the growing kernels flow along these capillary tubes as long as the plant is growing. When the wheat ripens, the flow of these juices stops and the capillary tubes become empty. When the wheat is released from the stalk during threshing operations it is reasonable to suggest that minute air particles may find their way into these empty capillary tubes inside the wheat kernels and in this way provide a most effective barrier to the entry of additional amounts of water.

Theory Supported

In support of this theory, Dr. Fritsch, a German scientist, claims to have observed traces of air bubbles emerging from wheat which had been damped and submerged in oil. This, he states, proves conclusively the existence of these capillary tube-like structures within the inner and outer layers of the wheat kernel. Another theory to account for the presence of air particles which have been observed amongst the outer bran layers and also in the inner layers, suggests that it may be due to the fact that in the very early stages in the development of the growing plant, minute air particles become absorbed by the individual kernels, and as they grow, these same air particles become hermetically sealed within the kernels.

Dr. Haltmeier's work established that the aleurone or hyaline layer between the outer coat and the endosperm retards the movement of water into the endosperm. It has also been proved that, in its natural state, this hyaline layer is more or less impervious to water penetration. In view of this, may it not be possible that this layer is partially composed of a collection of minute air particles, which would, of course, have the effect of retarding the entry of water into the endosperm?

There are a number of scientists

INSIDE SCIENCE

The Vital Story of BREAKFAST CEREALS

with essential vitamins and minerals restored

by Science Writer

This article is one of a series devoted to the story of vitamin enriched or restored cereal products: white bread and rolls, white flour, corn meal and grits, macaroni products, white rice, breakfast cereals, farina.

Increasing in popularity over the years, breakfast cereals are used throughout the United States by young and old alike. Eaten with fruit and milk or light cream, they contribute an excellent combination of basic, flavorful, nutritious foods to the diet.

In the past decade the use of these fine foods has grown markedly. In fact, it is estimated that there has been a 20% increase during the period. In 1953 the increase was much higher than the average of previous years. It was 5.5%.

During 1953, for example, many tons of breakfast cereal foods were eaten in the United States. Industry figures show that 4.6 pounds of dry cereals and 2.5 pounds of hot (cooked) cereals per person were consumed.

Many grains are processed to make breakfast cereals: wheat, corn, rice, oats. Often these foods may be eaten just as they come from the manufacturer's package. Or they may require only a short period of cooking to be ready for the table. They appeal to busy home-makers, as well as to institutional dietitians, because they are readily available in a variety of flavors to add interest and value to an important, but sometimes neglected, meal.

A Nutritional Advance

As the science of nutrition advanced in recent years, it was found that losses of essential vitamins and minerals occurred during processing of wheat, corn and rice into breakfast foods. When this became known, most manufacturers acted to overcome the losses. They adopted restoration.

Restoration simply means that certain vitamins and minerals are added to the cereal food during processing so that the finished product is generally equal to the whole grain values of those elements. The vitamins thiamine (B_1), riboflavin (B_2), and niacin as well as the mineral, iron, are used in restoration. Vitamin D is also added sometimes.

The recent trend toward pre-sweetened cold cereals for breakfast consumption and between-meal snacks emphasizes the nutritional importance of vitamin fortification. Increased calories require more "B" vitamins for proper utilization.

What the Vitamins Do

Thiamine is the vitamin which helps to build and maintain physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Niacin, which is another of the "B" vitamins, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Riboflavin is the vitamin which is essential for growth. It helps to keep body tissues healthy and to maintain proper function of the eyes.

Vitamin D is important to prevent rickets in children and the development of certain abnormal bone conditions in adults.

Iron is essential for making good red blood and for preventing nutritional anemia.

Where Do The Vitamins Come From?

At about the same time that processing losses in breakfast cereals became known, other developments in the science of nutrition produced ample supplies of vitamins at economical prices. Thus, the quality of breakfast cereal foods could be, and was, greatly improved through restoration.

Since the early days of breakfast food restoration and of white flour and white bread enrichment, the world-famous firm of Hoffmann-La Roche has supplied top quality vitamins by the tons. Pioneering work in its laboratories and by its collaborators resulted in the "duplication" of some of Nature's extremely complex substances. First, the chemical composition of the vitamin was learned. Second, the pure substance was isolated. Third, the "duplicate" was made by synthesis. And fourth, the laboratory techniques were extended to large scale operations.

The manufactured "duplicate" is identical chemically and in biological activity with Nature's own product. A vitamin is still a vitamin regardless of its source. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

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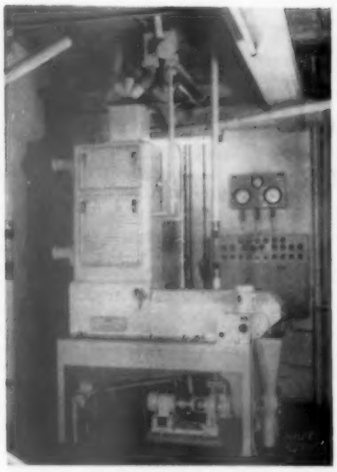

CONDITIONER—The MIAG vacuum conditioner for the treatment of the outer layers of the wheat kernel.

who have questioned the theory of the capillary tube-like structures within the wheat kernel and have declared that whilst it may possibly be true that these capillary tubes exist, it would be impossible for water to enter by capillary action, as the contained air would prove an effective barrier to the entry of water.

The presence of minute air particles within the wheat kernel having been established, it appears reasonable to assume that the presence of this air must be a barrier to the entry of additional amounts of water for mellowing purposes. The only effective method, therefore, would be to withdraw this air from within the wheat kernel in order to allow the water to enter.

When one comes to consider the question of these minute air particles contained in the inner and outer bran layers, the picture is becoming clear as to why our present methods of conditioning wheat by means of the hot water radiator, with hot and cold air currents, type of machine, has not had the success we have always hoped for. In this type of machine the principle is to try and force water into wheat by means of a sweating action which causes the pores of the wheat skin to open and absorb the water adhering to the outer coats, after which it is treated by currents of hot and cold air to seal the pores to prevent the water from escaping.

This procedure has had a certain amount of success but it can never have succeeded in driving all the air particles from within the wheat and has, therefore, never been able to achieve a standard of mellowness in wheat which is so necessary to our present day production of flour.

In the present type of radiator wheat conditioner we have one of the glaring instances of time lag possible in the whole milling industry, where it takes anything from one to two hours, or even longer, according to the type of wheat undergoing treatment, for the process to be concluded. Considering the time and amount of machinery employed to keep the wheat moving during this process, there is no wonder that the advent of vacuum conditioning is receiving the close attention of the industry.

With the presence of air particles in the wheat, it is reasonable to suggest, that the presence of this air must provide a barrier to the entry of sufficient amounts of water to secure uniform mellowness. The only effective method of withdrawing this air would be to submit the wheat in its natural state to the action of a vacuum, and, whilst the air has been withdrawn, admit a quantity of water to be absorbed by the wheat still in the vacuum.

This new development of conditioning by means of a vacuum is, of course, no new idea. It has been practiced by the milling industry for over a decade, the difference being in the application from an entirely new angle, the outcome of scientific observation over a long period and is based on actual results obtained in mills working under commercial conditions.

The milling engineering firm of MIAG has been responsible for the development of this new technique in vacuum conditioning, having designed and built this new type of conditioner in accordance with the theory postulated by Mr. Wille and Dr. Fritsch, and Dr. Gehle, the technical director of the MIAG, that water penetrates wheat by a capillary action into air spaces between the bran and in the endosperm.

This new type of vacuum conditioner is a small compact machine which takes up little floor space and stands in a single floor; the treatment takes only a few minutes. There is little doubt that this new development will eventually remove the guess-work from conditioning and enable the industry to achieve full benefit from a mellowed wheat.

—BREAD IS THE STAFF OF LIFE—

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CINCINNATI — Joseph B. Hall, president of the Kroger Co., Cincinnati, has announced the acquisition of the Big Chain Stores, Inc., operator of seven food stores in Shreveport, La.

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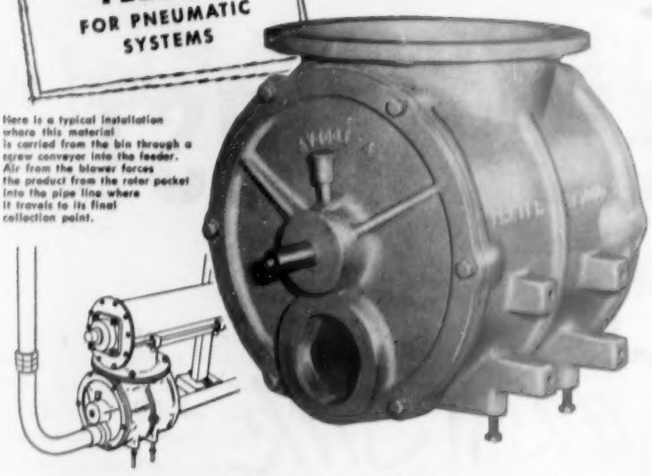

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A Basic Tool

Statistical Quality Control

By Dewey H. Robbins

Within the past 20 or 30 years a great deal of progress has been made in production and manufacturing controls. For example, we have work simplification, improved materials handling methods, time and motion study, production schedule control charts, and improved inspection techniques. An important development has been statistical quality control.

The savings in manpower resulting from the use of statistical quality control have generated much enthusiasm, and it is rapidly being recognized as one of the basic tools in the control of nearly all manufacturing processes. The object of this paper is to discuss briefly one application of the method to a milling process.

The essential tool in statistical quality control is the control chart. Briefly stated, the control chart tells us when to make adjustments to a process and when to leave the process alone. The theory behind this is based on the fact that any measured quantity of a manufactured product is always subject to a certain amount of variation as a result of chance. Some stable "system of chance causes" are inherent in any particular scheme of production and inspection. Variation within this stable pattern is inevitable, and it is, therefore, not possible, through the application of external effort, to improve the process beyond this range of stable variation.

For example, no automatic scale has ever been built that will always weigh exactly "on the nose." Invariably some weights will be over and some will be under. True, the range of overs and unders will be small in a well designed and highly sensitive scale, but there will be overs and

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EDITOR'S NOTE: Statistical quality control has been getting increased attention in feed manufacturing, flour milling and other industries as a basic tool in the control of manufacturing processes. For production men not particularly familiar with it, the accompanying article provides an introduction to one phase of the subject—the control chart for average and range—and it may stimulate further interest in the subject. The article deals with the application of statistical quality control to automatic weighing operations. The author, Dewey H. Robbins, is plant superintendent for the Fisher Flouring Mills Co., Seattle. The article is reprinted from the Bulletin of the Association of Operative Millers.

unders just the same. In a less sensitive scale the range of variation of overs and unders, while of the same general nature, tend to be larger. In both instances, however, there is nothing that any mechanic can do to improve the scale's sensitivity beyond the range of inherent or natural variation.

On the other hand, an automatic scale frequently gives poor and erratic weights due to some external cause not inherent in the natural characteristics of the scale. A worn pivot point, something touching a scale, or an accumulation of dirt will cause such a variation. Here a mechanic can correct the trouble and bring the scale back so that it will be within the variation pattern characteristic of the scale.

Provides the Answer

But, how are we to know if the process is in control—i.e., how can we determine if a process is operating in a normal manner and that any observed variation is within the normal chance pattern of the process? Or how can we determine when a process is not operating properly and therefore in need of attention? Statistical quality control provides the answer. For example, a control chart for variables, one of the basic tools of statistical quality control, would tell within a high degree of reliability whether or not our scale was performing properly. It would tell us if it should be left alone or if it needed attention.

Briefly, the control chart for variables consists of two parts—one for average and one for range. The part for average tells us within what limits we can safely permit the average of, say, five consecutive weighings to vary before assuming that the scale is not performing in a normal manner; and the part for range tells us within what limits the range, or difference between the lightest and the heaviest of the five may be permitted to go before indicating trouble. Of course, before we can construct and use the chart, it is necessary to establish limits for average and range and these limits must be consistent with the normal characteristics of the scale.

Suppose, for example, we wish to establish limits for average and range for an automatic packer packing 100-lb. bags. One way in which this could be done would be to weigh five bags, calculate the average weight of the five bags and also note the range—i.e., the difference between the lightest and heaviest bag. The bags are best weighed on an over and under check weight scale that indicates overs and unders to the nearest ounce. A sizeable number of weighings, not less than 25 weighings of five each, should be made at a time when from all indications the scale is performing in a normal manner and is not influenced by any external conditions. Having weighed 25 or more lots of five and in each case having calculated the average and range, we now calculate the grand average or the average of averages. This grand average will be very near an even 100 lb. if the scale is weighing properly. Likewise, we calculate the average range for all groups weighed.

Now it so happens that from this one single value, average range or bar R (R), we have all the information necessary to calculate trial control limits on our control chart for average and for range. Because we can never be sure, when getting data for control chart limits, that the scale is not influenced by some external factor or factors which might cause the variation to be other than normal, and because, also, 25 such group weighings are a rather small number from which to draw definite conclusions, future experience may indicate some modification in the limits established by this trial run.

Let us assume that the grand average in the above case was an even 100 lb. and that the average range (R) was 5.2 oz. It can be shown by statistical theory that if no group averages of future weighings are more than 0.58 R above or 0.58 R below the grand average—in this case not more than 3 oz. heavy or more

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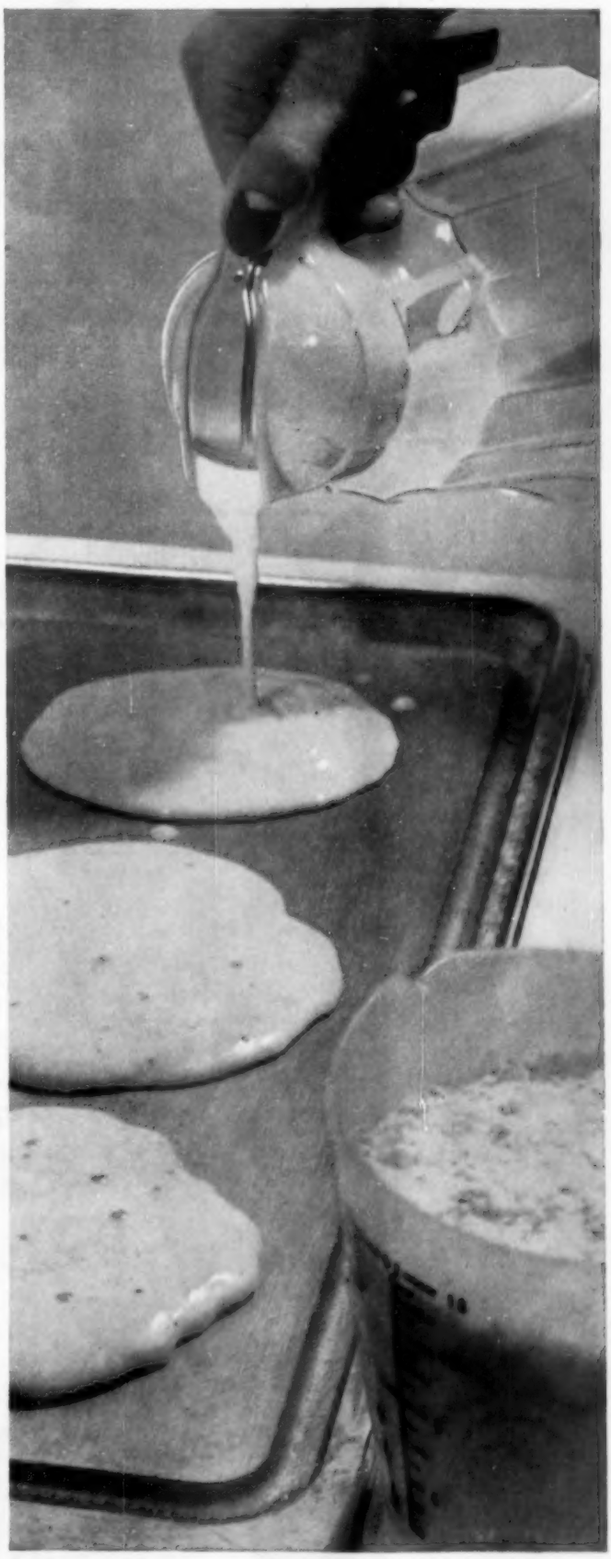

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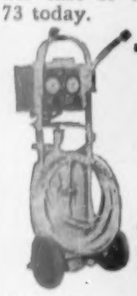

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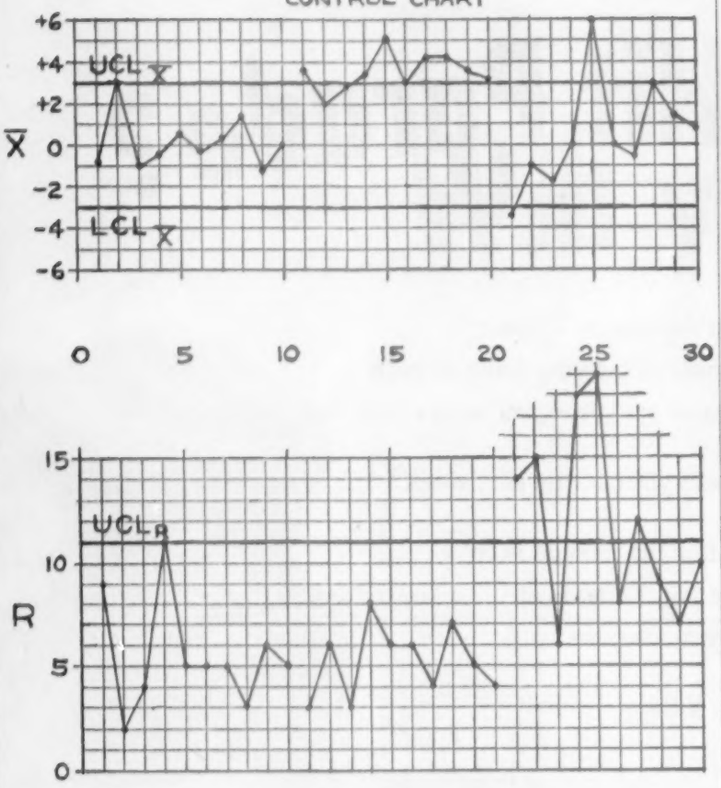
FIG. 1.
BAR X AND R
CONTROL CHART



than 3 oz. light—and provided further that no range (R) from any group exceeds 2.00 R—in this case about 11 oz., we can conclude with reasonable assurance that the scale is performing in a normal manner.

In other words, any variations observed, provided they stay within the above limits for the average and range, are in all probability due to normal inherent characteristics of the scale itself; and, therefore, there is nothing that anyone can do to make this scale perform better. In fact, any attempt to improve the performance of the scale by adjustment or otherwise will almost surely make it worse and not better.

To repeat what was said before, this is one of the most important things statistical quality control does for us: it tells when to leave an automatic process alone and give it a chance to work rather than to be continuously making adjustments and changes and thereby continually keeping it from performing as it should. Such a procedure saves maintenance time, saves manpower and provides better quality control in any automatic process.

We said above that, provided the group average stays within the plus or minus 0.58 R and group range, R, does not exceed 2.11 R as calculated above, then in all probability any observed variations will be due to inherent causes and cannot be corrected by any external means.

Statistically speaking, the probability of finding a group whose average or range exceeded these limits is about three in one thousand. In other words, 99.7% of the weights will fall within these limits provided the scale is operating properly. The chances of getting one outside these limits for a properly working scale are so small that we disregard such a probability. It is on this basis that statistical quality control works.

Having shown how to estimate trial control limits for a scale when using groups of five, we may now apply these limits to an actual condition. Table 1 (below) lists 30 group weighings of an automatic scale weighing 100-lb. bags. The results are plotted on a control chart for our X and R—Figure 1.

In the first 10 weighings the scale was performing properly and no average or range was out of control. In the second 10 weighings a 4-oz.

Table 1—Inspection Data—100-lb Packer

Check No.	Bag weights—over—and under (oz.) X1	X2	X3	X4	X5	Aver. X	Rge. R
1	—6	—1	—1	3	1	—0.8	9
2	3	4	2	2	4	3.0	2
3	—3	—1	—3	1	1	—1.0	4
4	—3	—3	—4	1	7	—0.4	11
5	0	4	1	—1	—1	0.6	5
6	0	2	1	—1	—3	—0.2	5
7	1	2	—3	0	1	0.2	5
8	2	2	0	1	1	1.4	2
9	1	—3	—2	—4	2	—1.2	6
10	2	1	0	0	—3	0.0	5
11	4	5	2	3	4	3.6	3
12	5	4	2	0	—1	2.0	6
13	4	3	4	1	2	2.6	3
14	1	8	1	7	0	3.4	8
15	3	4	7	3	9	5.3	6
16	5	5	—1	2	4	3.0	6
17	2	5	4	4	6	4.2	4
18	0	4	5	5	7	4.2	7
19	1	5	5	1	6	3.6	5
20	2	3	6	2	3	3.2	4
21	—10	3	—1	2	—1	—3.4	14
22	—9	0	5	6	—7	—1.0	15
23	—5	—1	—1	—3	1	—1.8	6
24	5	—10	—3	0	8	0.0	18
25	4	8	18	—3	6	6.0	19
26	5	—3	—1	—1	0	0.0	8
27	—3	7	2	—5	—4	—0.6	12
28	6	6	4	—3	2	3.0	9
29	—3	—1	3	4	4	1.4	7
30	2	—2	—3	7	0	0.8	10

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weight was added to the scale, making the average shift to 100 lb. 4 oz. Notice that this did not change the range or the sensitivity of the scale, but did indicate a shift in average. In the third set of 10 weighings, heavy grease was applied to certain working parts of the scale to decrease its sensitivity, and the 4-oz. weight was removed to bring the balance back to 100 lb. Observe that while the average tended to come back into control, it did show wide variation. The range fluctuated widely and indicated definitely that there was something wrong with the scale.

The above example illustrates the type of information we get from a control chart. The usual two things which can happen to an automatic process are:

(1) Something happens to cause a shift in the average, or

(2) Something happens to cause a shift in the range.

The control chart for X indicates the first, and the control chart for R indicates the second.

The above discussion on statistical quality control has been limited to a brief and non-technical introduction to only one phase of this subject—namely, the control chart for average and range. Of course statistical quality control offers other control charts and other techniques but their discussion is beyond the scope of this paper. If this paper stimulates interest among those who previously have had no contact with the subject, then it will have served its purpose.

—BREAD IS THE STAFF OF LIFE—

Kansas State Reports On Wheat Quality Testing Project

MANHATTAN, KANSAS—The department of milling industries at Kansas State College recently issued a report on its seventh annual cooperative project with industry to test and advise on hard red winter wheat quality.

(Copies of the report may be obtained from the milling industries department at Kansas State.)

Twelve hard red winter wheat samples were included in the 1955 collaborators' study of milling and baking quality. Four varieties were from Kansas and consisted of composites made from four locations. Four varieties were from Nebraska. The four varieties from eastern Nebraska represented a single location, while the same four varieties were composited from three western Nebraska locations.

The samples of wheat were milled and scored for milling quality on the Kansas State College pilot mill. The samples were coded and sent to 24 collaborators for study of baking quality characteristics. They were also studied in the Kansas State College pilot plant bakery.

The four varieties from Kansas were Ponca, KanKing, C.I. 12518 (a selection from a Chiefkan x Oro-Tenmarq cross), and C.I. 12804 (a selection from a Mediterranean-Hope-Pawnee x Oro-Illinois No. 1 cross). The four varieties from Nebraska were Nebred, C.I. 13015 (Pawnee x Nebred), C.I. 13007 (Pawnee x Cheyenne), and C.I. 13017 (Pawnee x Cheyenne).

Three of the four varieties from Kansas had excellent milling and baking properties. Ponca, used as a standard, was slightly preferred to C.I. 12518 and C.I. 12804. KanKing was considered inferior and unsuitable so far as baking chaarcteristics were concerned.

The four varieties from eastern Nebraska possessed excellent milling and baking properties. The varieties C.I. 13007, C.I. 13017 and C.I. 13015 grown in western Nebraska were considered inferior. This demonstrates the important effect of environment on bread quality.

The report noted that although the variety of wheat is one of the major factors affecting the desirability of wheat for a given intended usage, the modifying effects of environment on quality of wheat must always be reckoned with. Each year the collaborators' study brings forth the important effect of environment. The studies stress the need for continued research on weather and soil factors that modify and change the properties of wheat.

It also was pointed out that the need to study the blending properties of new varieties has become evident. In another year plans will be made to include such studies at one or more laboratories.

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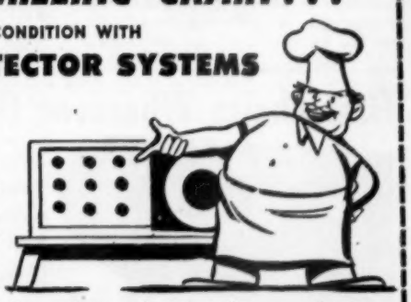

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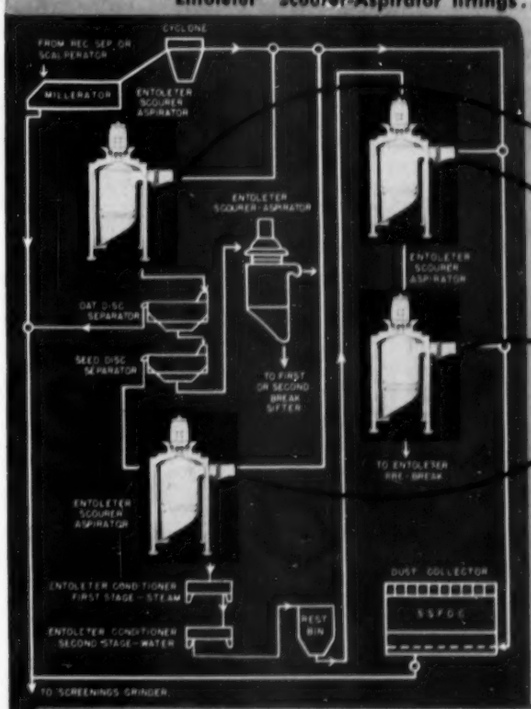

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No. 4031—Sifter Bulletins

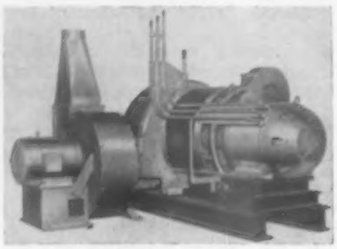
The Richmond line of sifters is now being manufactured and further developed by Sprout, Waldron & Co., Inc., and the company has recently prepared bulletins on the sifters. For the benefit of present owners and operators of Richmond sifters, Sprout-Waldron spokesmen also noted that a special engineering and advisory department is now maintained for furnishing parts of existing machines and to recommend and furnish additional equipment to improve efficiency or increase capacity. The literature tells of the various Richmond sifters: Bulletin No. 135-A — Gyro-Whip Sifters—a complete line of floor mounted sifters, capable of producing 2 to 12 separations. Bulletin No. 136 —Super Sifters—a ceiling-suspended type with self-balancing drive, capable of making up to 8 separations; made in two, four or six sections, with sieve stacks containing up to 30 sieves. Bulletin No. 138—Gyro-Lab Sifters—for experimental and research laboratories and for light production in processing plants; makes 2 to 5 separations with time limit or continuous flow operation. Bulletin No. 139 — Gyro-Pedestal Sifters — a single-sieve, two-separation unit for handling either batches or streams of free flowing materials containing small percentages of oversizes. To obtain these bulletins, check No. 4031 on the coupon and drop it in the mail.

No. 5372—Lifter

A new, light duty "electraulic" lifter is being introduced by the Colson Corp. It has a load capacity of 1,000 lb. and is equipped with a ¾ H.P. motor with magnetic fused starter. Lift height is 5 ft. 8 in. Lift speed is 15 ft. per minute. The lifter's length is 39 in. A hinged door on the power unit cabinet permits easy access to the motor. The rear swivel casters are 5 in. in diameter and the front rigid casters are 8 in. in diameter. Side thrust rollers absorb side shock on the platform. The platform is 24 by 24 in. Over-all weight of the unit is 455 lb. The new lifter also is available in battery powered, hand hydraulic and hand winch models. Secure more complete details by checking No. 5372 on the coupon.

No. 5357—Hammer Mill

The Prater Pulverizer Co. has announced the production of a new hammer mill, called by the trade name Prater Dual-Power Advance custom mill. Using a heavy duty motor directly connected to the company's Blue Streak blower, in addition to the usual power connected to the Blue Streak Advance custom mill, company officials state that the additional motor permits the power conveying of grains and other ingredients in any direction. The extra power permits a heavier load to be handled by the custom mill, it is claimed. The unit is available for immediate delivery. Secure more complete details by checking No. 5357 on the coupon and mailing it.



No. 5378—Vibrating Feeder

The Richardson Scale Co. announces a new four-page bulletin describing its Velofeeder, a new mechanical vibrating feeder. The feeder is designed to facilitate a steady flow of any loose bulk material such as soybeans into such processing machinery as automatic scales, grinding mills, pulverizers, mixers, conveyors, elevators and packaging machinery. The bulletin outlines the operating principles and specifications of the feeder. Nine photographs show the device actually feeding a variety of materials, and a full-page engineering drawing details its design. Secure more complete details by checking No. 5378 on the coupon and mail it to this publication.

No. 5382—Bag Packer Brochure

Just completed for free distribution to users of multiwall paper valve bags is a new brochure containing detailed descriptions of the various models of its Auger-Matic bag packer now being offered by the E. D. Coddington Mfg. Co. While the original Auger-Matic was designed primarily to fill valve bags with free flowing materials, continuous research with a wide range of products has led to the development of different models to meet the varying needs of multi-wall valve bag users. The company claims that it is now possible to pack light and fluffy materials or even coarse pellets just as successfully as fine powder on the different models which are now available. The brochure will be sent if you will check No. 5382 on the coupon and mail it to this publication.

—BREAD IS THE STAFF OF LIFE—

General Mills Gets Radioactive Material

MINNEAPOLIS — A powerful source of radioactivity was installed at the General Mills, Inc., Research Laboratories Jan. 17 to be used in studies of chemicals and food irradiation. The project was carried out under the direction of L. F. Borchardt, director of General Mills physical research, and his associate, Donald Young.

The source, nearly 4,000 curies of high activity cobalt 60, was shipped by truck from the Oak Ridge National Laboratory.

The only major cobalt source in this area and one of the largest in the country, its radiation energy is equivalent to about 6,000 grams of radium which would be worth about 120 million dollars. This is far more radium than has ever been isolated in the world.

For safe usage, the cobalt will be kept submerged under a shield of 12 ft. of water in a well 4 by 6 ft. Material to be irradiated will be lowered to the bottom of the well and placed adjacent to the cobalt.

General Mills research officials point out that the radiation studies of foods and chemicals will be a broad program involving a number of different possible developments.

Generally, Dr. John Andrews, director of General Mills food research, and food scientists at other laboratories, expect food irradiation studies to result in products with greater consumer convenience and less physical and flavor change in processing and storage. But, at least in the foreseeable future, this treatment cannot be expected to replace the conventional heating and freezing processes.

Send me information on the items marked:

- ☐ No. 4031—Sifter Bulletins
- ☐ No. 5357—Hammer Mill
- ☐ No. 5372—Lifter
- ☐ No. 5378—Vibrating Feeder
- ☐ No. 5382—Bag Packer Brochure

Others (list numbers) .....

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—CLIP OUT — FOLD OVER ON THIS LINE — FASTEN (STAPLE, TAPE, GLUE) — MAIL—

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(Sec. 34.9, P. L. & R.)
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Larvacide CHLORPICRIN — The SAFER Fumigant

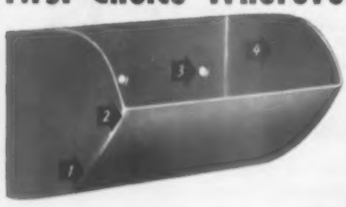
Fast • Easy to Use • Effective

Kills include egglife and larvae; also rodents, without carcass nuisance. Liquid: cylinders 25-180 lbs. and 1 lb. bottles.

Also Available Pressure Dispensed

Larvacide Products, Inc.
117 LIBERTY ST., NEW YORK 6, N. Y.

First Choice Wherever Grain is Handled



Your jobber has them, or write B. I. Weller Company, 327 South LaSalle Street, Chicago 4, Illinois.

(1) The logarithmic curve design loads easier . . . dumps cleaner . . . permits high speeds.
(2) Scientifically formed lip aids in greater cup capacity.
(3) Bolt-hole placement gives better cup balance . . . saves belting.
(4) Hyperbolic sideboard ends permit greater load capacity without "slopping."

CALUMET CUPS

Good Lubricant Care Is More Important Now

● By Ernest W. Fair

Lubrication requirements of modern milling machines with their high speeds, high loads and precision adjustments, are becoming increasingly more severe today. In addition to this, the improved properties in premium grade lubricants, which have been secured by addition of small quantities of selective additives, requires greater care in handling, storage and usage than ever before. These additives are present in very delicate balance. If this balance is disturbed to even the smallest extent, the properties of the lubricant become impaired.

These new developments make it absolutely essential that every type of modern lubricant used in the mill be handled with the utmost care today. And this is just as important whether the mill be small or large and whether the amount of lubricant stored be a single can or a hundred drums.

Proper care begins with attention to unloading, particularly of large drums. Transfer direct to a loading platform is best. Should there be none present, it is important that a ramp be used and the drums slid endwise to the lower level. Drums should never be dropped even to a cushion for the seals thereon can be split and leakage will occur.

Where distances are very short, such drums can be transferred by rolling, but where distances are long, it is much better to do so with hand trucks, lift trucks or other conveyance, in order to avoid any strain on the seams.

Storage

It is also important that lubricants be stored in a central location so that there will be no more than ordinary amounts of handling of containers, i.e., the shorter distance, the less chance for damage to the container. The storage area should also be one free of dust and vapors or other possible forms of contamination. Storage indoors is always preferable.

However, in some instances, outdoor storage of large drums in particular is necessary. Under these circumstances they should be placed on their sides and on racks but never laid on the ground. The old practice of setting them upright on end was found to bring about accumulations of rain water which is sucked into these drums by normal breathing actions.

It is, of course, best procedure to store all lubricants in a fire-proof area. Brick, tile or concrete walls are preferable and floors should be of the same materials as well as fitted with suitable drains. Woodwork, in addition to being a fire hazard in connection with lubricant storage and handling, is very difficult to keep clean.

Cleanliness is too often neglected in such storage. The average workman feels that the containers in which the lubricants are housed are sturdy, safe and secure and that nothing can enter them. This is true to some extent but not to perfection for extensive studies have shown that (in addition to the aforementioned disturbance of chemical balance) such contamination is possible in even the finest of modern lubricant containers. Where such storage areas are kept painted in light colors, we are providing an added protection.

It has also been found that, regardless of the volume of such storage, it is always advisable to keep different brands and types of lubricants stored separately and in their proper places. An error in use of any given lubricant may cause very serious damage to the machine upon which the wrong lubricant is applied in any mill today, so specialized have lubricant requirements become.

It is also inadvisable to order lubricants in too large quantities today. Available discounts for large quantity purchases have become smaller and smaller and seldom justify the possible hazard involved in taking care of large amounts of stored lubricants. There is also the danger of ineffectiveness brought about through changes in their delicate chemical balance over a long period of time.

No Direct Heat

Direct heat should never be applied to any lubricant container where it is necessary to transfer from a cold storage area to the mill for immediate use. Such direct heat melts the sealing compounds on drums and results not only in leakage, but possible harm to the product. Best procedure is to make the transfer sufficiently ahead of time to allow room temperatures within the mill to do the job slowly and safely.

It is also to be noted that exposures to temperature extremes can damage modern lubricants. It is far better to discard a lubricant that has been subjected to such temperature extremes than to risk its use on equipment.

Much damage to lubricant efficiency is often brought about in actual use of such lubricants in the mill. Any and all equipment that is to be used in transferring a lubricant from

(Continued on page 18a)

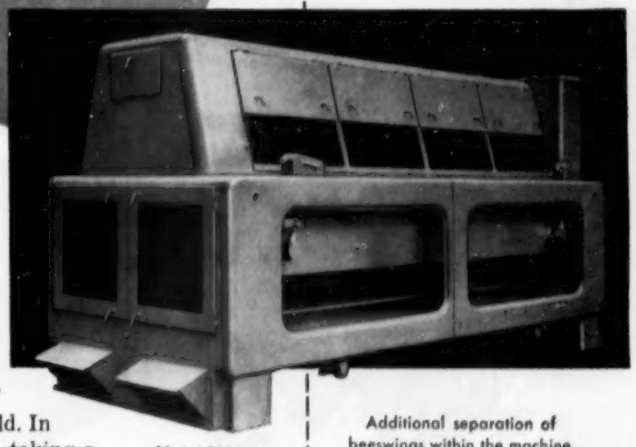
HAS PAID FOR ITSELF WITHIN A YEAR!

...under average North American conditions

BUHLER

TRIPLE-DECK, ALL-METAL

PURIFIER



Model MQRC

- Accurate, efficient air adjustment is possible at any time for each section of the sieves. Built-in lights provide good observation.
- Classifies middlings by quality as well as by size.
- Re-purification is unnecessary in almost all cases.
- Up to 6 separations for each inlet (half machine) are possible —3 tailings plus 2 or 3 cuts of the throughs.
- Fluctuations in mill flow caused by variations in wheat quality and its preparation can be observed and re-adjusted immediately.
- Sieves exchangeable while machine is running and operating.

Replacements of conventional purifier systems by Buhler triple-deck all-metal machines are producing striking results in mills all over the world including North America.

Many installations have paid for themselves in less than a year through better extraction of low ash content flour.

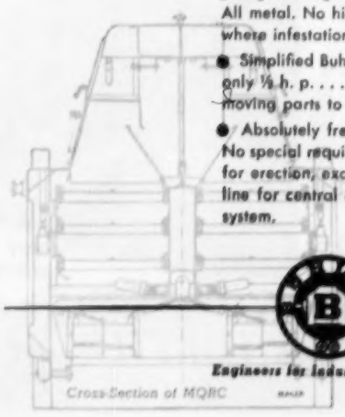
Such records have established the "Buhler" as the standard purifier throughout the world. In North America, more and more millers are taking a long look at their present purification systems, and a quick look at Buhler methods. Comparisons show Buhler's outstanding superiority. And you get a beautiful piece of machinery that is a credit to the appearance of any mill.

Let Buhler's vast experience in designing, building, and applying triple-deck purifiers save you money. Write for complete information.

Additional separation of beeswings within the machine reduces stocks in dust collector system.

Sieve cleaning arrangement is absolutely automatic and trouble-free. Frames equipped with silk tightening device.

- Highest degree of sanitation. All metal. No hidden spots where infestation can develop.
- Simplified Buhler drive requires only ½ h. p. . . . no other moving parts to be maintained.
- Absolutely free of vibration. No special requirements needed for erection, except suction line for central aspiration system.



Cross-Section of MQRC

SPROUT, WALDRON & CO., INC.
Buhler Brothers Division
26 LOGAN ST., MUNCY, PENNSYLVANIA

BUHLER BROTHERS, INC. U.S.A.
434 SYNDICATE BLDG.
MINNEAPOLIS 2, MINNESOTA

BUHLER BROTHERS (Canada) LTD.
24 KING ST. WEST
TORONTO 1, ONTARIO

Engineers for Industry Since 1860

876

EUROPEAN MILLING

(Continued from page 1a)

land some mills were using covers finer than our own usual standards.

Milling Methods Differ

In their efforts to satisfy their own markets, using wheats that characteristically vary from the softest and dangerously damp to the hard springs of Manitoba, according to the government dictates, European mills obviously require a more elaborate plant than our average mill. Other millers from this country have and will be making a much more detailed comparison of mills and milling methods than I can do here, but I would like to mention as being of special interest to me the article in the December issue of Milling Production entitled "How the U.S.S.R. Adopted U.S. Milling Techniques" by N. I. Pesakhowich. Let it suffice to say here that the European miller has to continuously strive to adjust his flour quality by adequate wheat conditioning, sometimes using four complete conditioning systems for one milling unit to bring the wide varieties to a uniform milling condition with the required baking potential. He also uses much longer roll lengths, greater bolting surfaces, a more complicated and finely divided flow sheet and sometimes water cooled rolls. These, along with pneumatic elevation, which has become almost standard, enable the European miller to process much cooler than we ordinarily do. Thus, they handle the high moistures involved from the conditioning process and soft wheat, and at the same time, obtain high extractions and clean products which often run to 16% moisture in the flour. Trying to compare milling results by yield and ash is difficult at best, and as far as I was concerned, I was unable to do so. Permissible moistures, varying ash standards and wheat types were only a few of the problems. Extraction figures, as given, ranged all the way from 72% to 80%.

As you know, there has been a very definite trend away from using ash as a criteria of flour quality in favor of color grading. This is more pronounced in England than on the continent but is spreading rapidly and is, of course, beginning to get serious consideration over here.

Also, as a matter of interest, there seems to be a marked trend abroad towards roller or ball bearings on rolls now being produced by the foreign machinery manufacturers and shipped all over the world. A number of old problems in connection with anti-friction bearings seems to have been licked and personally, I am of the opinion that a good case can be made for the replacement of existing stands in this country by the new roller mills, if money is available and other mill needs are not more pressing. The theoretical advantages are obvious to all of us, power saving, automatic throw-outs to save wear on corrugations and ease start-ups and shut downs, less maintenance, more uniform feeds, dynamic balancing, sanitation, etc. In addition, the application of drives is more flexible and maintenance can be done on one half a stand while the mill is in operation.

Emphasis on Quality

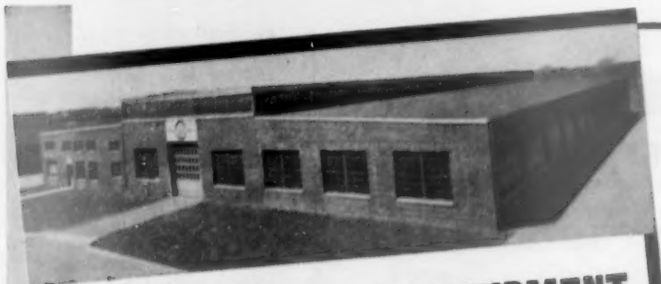
Further evidence of the European miller's emphasis on quality production rather than quantity can be found in the almost universally higher degree of refinement in the flow sheet. In several plants, the 4 to 6 breaks were divided into coarse, medium and fine for everything after the first break, and in one plant there were 18 reductions following the sizings. Often the smooth reductions have been broken in by the cool milling process or started off by an emery treatment. With their bolting and surfaces and cool milling, little flour is returned to the following reduction. No matter which way we look at the general problem of milling, we have to regard the related questions of "how good or how much." It certainly should be worth a close inspection of a number of our own problems which perhaps might already have been solved by our friends abroad.

When quantity is stressed, yield and percentage are sacrificed to a certain extent as well as lower control, although our own figures are not definite enough for comparisons. There is here in the U.S. a very definite disadvantage for the cause of quality milling and there is a very distinct advantage for the cause of quantity milling. This is for the reason that the advantages and financial benefits can very simply be figured out when it comes to capacity, or in other words, quantity milling.

It is also difficult to get much from abroad as to how far we should go in automation—this because of the fact that our wage scales and points of diminishing returns vary so much, particularly when automation begins to get overly complicated.

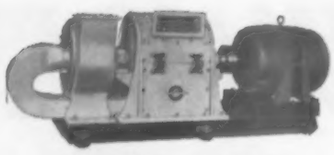
Another area where the European miller seems to have a markedly different viewpoint is in his attitude toward capital expenditures or plant renewal. I know there are good reasons for this, such as short profits, over here, but let's look at it from the European point of view.

The European miller is invariably intensely proud of his plant and many of them plan for either com-



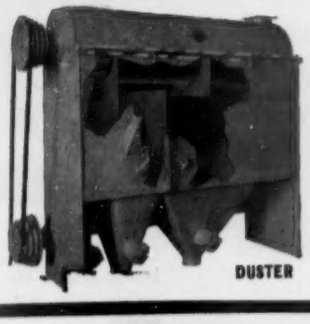
MODERN FORSTER EQUIPMENT PAYS BETTER MILL PROFITS

Each of these Forster machines for better flour milling does a specific job superbly well. Each was originated to meet a definite need for more efficient milling and cost saving. They are profit makers. Forster machines handle milling jobs from start to finish . . . wheat scouring, conditioning, feed grinding, feed finishing, dusting . . . plus elevating and conveying equipment, dust collection systems and bins. Call Forster for profit-making mill equipment.



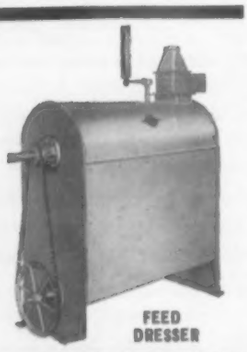
HAMMER MILL—4 CAPACITIES

ELEVATOR HEADS, BOOTS, CONVEYORS, BINS



DUSTER

FEED FINISHER



FEED DRESSER

WHEAT CONDITIONER

CYCLONE SCOURER

The FORSTER MFG. CO. 1425 So. McLEAN BLVD. WICHITA 12, KANSAS

plete plant renewal every 20 years or a continual program of keeping it up to date with the latest machinery and methods. The European miller is in business to stay and he probably expects his grandchildren to operate the business just as his forebears did before him. To him this adds up to the necessity for keeping a modern mill and he seems well aware of the wide gap in efficiency and milling ability between a plant that is not up to date and one that is. As nearly as I can calculate, this would mean in our terms that 10¢ per hundredweight of daily capacity should be set aside for depreciation and replacement. This does not include enough money for maintenance, which is a separate figure, and I believe in most of our good plants in this country this latter figure would amount to 4-5¢ per cwt. to maintain the mill in its present condition. The European miller figures that it is worthwhile to set aside something approximating this amount of money that guarantees his future. Perhaps, however, in some of the countries as an offsetting factor, more liberal allowances are made in the way of tax reductions and depreciation allowances.

He does, however, gain a good many intangible advantages. In addition to having a good, efficient plant, he has one that is sanitaary, good looking, a safe one to work in, as well as a pleasant one.

Certainly it is not up to me to judge which of these attitudes is best for anyone except ourselves, but in the long run it is our own plant upon which we depend for our livelihood and our way of living. In case the opposite of the European policy has been followed in the past, the job is doubly difficult because of inflation and because year by year plants have been getting more complicated and milling machinery and methods have already made very rapid strides.

Bulk Flour Handling

I might add a short paragraph on bulk flour handling abroad. As to general package problems, they do not appear to have gone as far in this direction as we have. However, there are several good reasons for this. First, most of their bakeries are small, their streets are narrow, very little flour is handled except by truck, and quite often there hasn't been too much necessity for bulk storage, seeing that they are not forced to handle as many different grades as we do, particularly because most of the millers only have a local business. However, there probably will be some room for bulk handling from mill to storage and out again, especially if there are one or more large baking plants nearby. To show that European millers have been considering bulk transport of flour for a long time, I might mention the fact that I did see a picture of an actual bulk truck which emptied itself by conventional screw conveyor method which was designed and built for service in Vienna dated 1939. However, due to the war and other circumstances, this development was not pursued further.

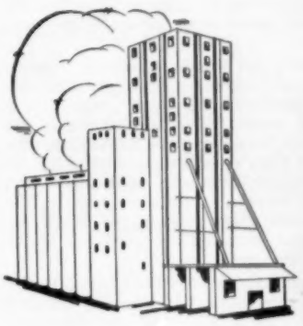
Unquestionably, we have much to learn from the European millers and their leading mill builders or machinery manufacturers. On the other hand, I believe that they are very well aware that there are certain fields in which they can learn things of importance from us, particularly along the lines of materials handling and packaging. More transferring and exchange of information by all of us will greatly aid in the gathering of the information that we require; and certainly it should not be done in a spirit of trying to decide whose methor or machine is best but rather in the spirit that will enable each one of us individually to more intelligently select machines and methods which are particularly suited to our own goals and conditions. While we are doing this, we should always seek new ways of informing and proving to our own management the necessity for the economic advantages of modernizing, building or changing any one or all of the machines or methods which are charged to our responsibility.

At the close of this paper I would like to say again that during the course of my travels in Peru, Brazil, France, Switzerland, Germany, Italy, England and Scotland, I was delighted not only with the hospitality extended but also the general spirit of cooperation and the attitude that what is good for one is good for all. This was not only true of the millers themselves but also all of the half dozen mill builders and machinery manufacturers that I came in contact with.

—BREAD IS THE STAFF OF LIFE—

ROLLER MILL DAMAGED

WILKES-BARRE, PA. — A two-hour fire resulted in $30,000 damage to Benton Roller Mill located near the Benton junction. John Mather, owner, said the fire might have started from an overheated bearing pulley on the fifth floor.



Use DUSTA-CIDE for PREVENTION of GRAIN SURFACE INFESTATION

Infestation or reinfestation of grain surfaces is **preventable.**

Where subsurface grain is free of infestation there's no need to have a few surviving or invading insects form the nucleus of a surface infestation or reinfestation.

Timely application of Dusta-Cide will forestall surface infestation or reinfestation at a fraction of the cost of fumigation.

APPLY DUSTA-CIDE NOW

Late winter or early spring is the ideal time to apply Dusta-Cide — before surface reinfestation occurs with the arrival of warm weather.

Write for information on price, dosage and application

Dusta-Cide
Weevil-Cide Grain Surface Insecticide

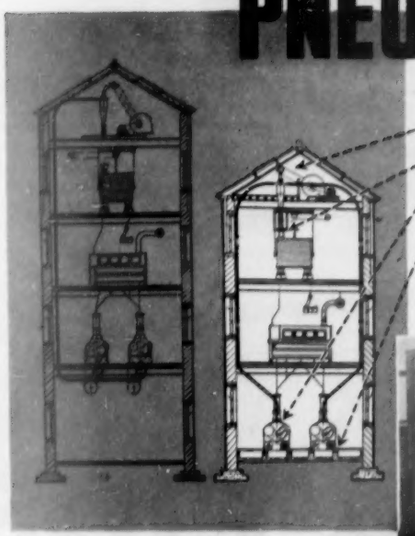
THE WEEVILCIDE COMPANY 1323 UNION AVENUE KANSAS CITY 1, MISSOURI

PAPER SACKS FOR MILLERS
The Chatfield & Woods Sack Co.
CINCINNATI, O.

NOW! Trouble-free Pneumatic Conveying

'PNEU-FLOW'

(British Patents Nos. 687321, 687322. Overseas patents pending.)



SPACE-SAVING reducing capital expenditure.

CYCLONES mounted directly on to plansifter feed-boards.

MINIMUM LIFT — Stock is lifted vertically through rollermills.

A STRAIGHT FLOW from hopper allows basement-fitted rollermills.

Look for these five all-important factors when choosing a pneumatic conveying system 1—overall efficiency, 2—power consumption, 3—freedom from chokes, 4—simplicity of layout, 5—the space it occupies, plus freedom of access to vital machinery.

'Pneu-Flow' was designed to withstand this searching scrutiny. Only 'Pneu-Flow' offers the advantage of lifting stock vertically from the hopper, up through the rollermill. New minimum lift of stock saves power. Absence of vicious bends makes hold-ups a thing of the past. Yes, 'Pneu-Flow' is choke-proof. Better still, 'Pneu-Flow' is available, versatile, sanitary, adaptable to *any* mill or smut department.

SAVING POWER AND SPACE

Compare the savings with the outmoded, conventional layout, left. See how bends are smoothed out—even avoided. Notice, too, how the vertical lift is cut down. 'Pneu-Flow' reduces building heights and power consumption.

A typical layout of Robinson Receiver Aspirators—Type PFm

A "ghosted" rollermill showing the vertical lift from the hoppers.

Robinson
OF ROCHDALE, ENGLAND

KIPP-KELLY LIMITED
68 Higgins Avenue, Winnipeg, 2
65 Market Street, Toronto, 1

LUBRICATION

(Continued from page 15a)

its container to the point of lubrication should be kept clean and it is advisable to clean that equipment each time before usage. It takes very little (and hard to see with the eye) accumulations of dust to contaminate any lubricant with resultant unnecessary wear on bearings and other machine parts to which it is applied.

It is also advisable to keep very accurate records on lubricant use and to date containers where any appreciable amount of stock is kept in storage in order to make certain that the oldest lubricants are always used first.

We must also be on constant guard against employee lapses in their use on machines. Wherever possible, it is best to centralize such chores in the hands of one or more individuals who have been given proper instruction in their handling and application and who have also been trained to the extreme importance of the use of the proper lubricant on each particular machine spot.

Some engineers have pointed to the all too prevalent idea among workers that "oil is oil" and one lubricant much the same as another. This is an idea with no place in our modern mills. The indiscriminate mixing of types and brands can often cause as much damage to delicate equipment as the use of improper lubricants in the first place. It will pay any mill management to make certain that supervisory personnel have impressed on every machine operator that there is a specific and definite lubricant for his machine and no other.

Finally, there should also be a constant guard against contamination of lubricants through any means or method. In the past, for example, water contamination could be handled by allowing the moisture to settle to the bottom of the container. Today, with the use of so many additives, this has changed. Many of these additives are water sensitive and some may be removed partially or completely by contact with just a trace of water.

2 Firms to Make New Type of Pallet

NEW YORK — Appointment of Mead Board Sales, Inc., Lynchburg, Va., and Sonoco Products Co., Hartsville, S.C., as manufacturing and sales agents for Accopak pallets, a new device for industrial palletizing, has been announced by R. E. Sumner, manager of the industrial chemicals division of American Cyanamid Co.

The paper pallet, which can support a load up to 4,000 lb., consists of a kraft paper sling fitted with spiral-wound paper tubes. It is adaptable for use with any type of fork lift truck equipped with a new type bayonet fork. The pallets are inexpensive, require little storage space and are easily and quickly assembled, officials of American Cyanamid say. As a result, they say, it has proved possible to palletize, handle and ship bagged and sacked commodities at substantial savings in time, money and space as compared with any previous methods.

American Cyanamid first announced the new pallet about a year ago.

——BREAD IS THE STAFF OF LIFE——

Promotions Announced By Fort Worth Steel

FT. WORTH—John D. Wittmayer has been appointed to the new post of controller of Ft. Worth Steel & Machinery Co. He continues as the firm's secretary-treasurer, a position he has held for several years. Miss Marguerite Bridges has succeeded him as chief accountant and also has been appointed assistant secretary of the company.

Mr. Wittmayer had been chief accountant since joining the company 6½ years ago. A Ft. Worth native, he was graduated from Texas Christian University in 1941.

Miss Bridges was corporate secretary of Monarch Manufacturing Co. of Ft. Worth before taking her new position. Monarch was recently acquired by FWS&M.

Fort Worth Steel & Machinery manufactures machinery for handling bulk materials and specialized machinery for feed mills.

Need New Rolls?

In addition to our roll corrugating and grinding service for the flour milling industry, the Twin City Machine Co. also supplies new rolls, and we will be pleased to receive your inquiries.

TWIN CITY MACHINE CO.

Roll Corrugating and Grinding New Rolls

527 Second Avenue, S.E. Minneapolis Minn.

A. E. BAXTER ENGINEERING CO.

Designers and Engineers for Mills, Elevators and Feed Mills

900 ELECTRIC BUILDING BUFFALO 3, NEW YORK

EXAMINATION SYLLABUS

(Continued from page 3a)

Section VII

EFFECTS OF ATMOSPHERIC CONDITIONS ON MILL STOCKS (including Wheat and Flour)

A.

(i) Knowledge of conditions conductive to the development of:
- (a) Moulds.
- (b) Mites.
- (c) Insects.

(ii) Methods of preventing development of (a), (b), (c).

(iii) Recognition of stocks affected by (a), (b), (c).

(iv) Knowledge of the effect of atmospheric conditions on the behaviour of stocks being handled on Plansifters, Centrifugals, etc.

(60 marks)

MILL HYGIENE

B.

Candidate is expected to know what is involved in maintaining a high standard of cleanliness in the mill; where to look for the first developments of infestation (i.e., the habits of the common Mill Pests); also the dangers associated with dirty bags and how to deal with them. (40 marks)

Section VIII

APPRECIATION OF CONTROL TESTS

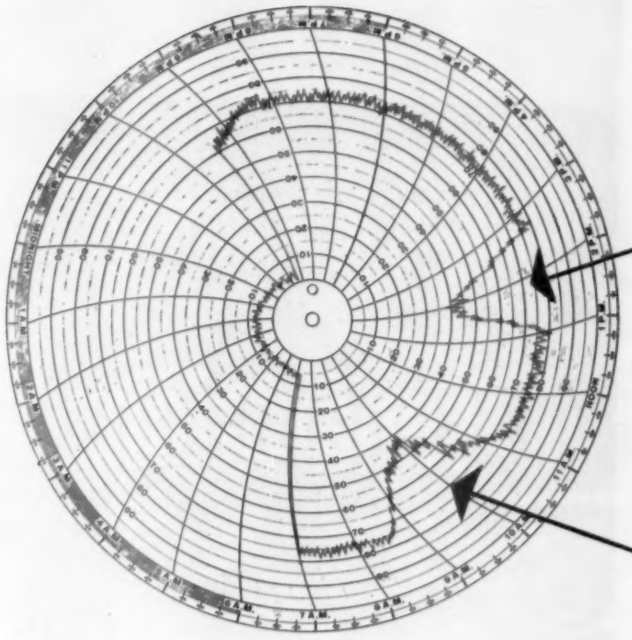
(i) Bushel Weight (Performance and Interpretation).

(ii) Sifting Test (Hand and Mechanized). (100 marks)

Section IX

MILL TALLY

Candidate is expected to be familiar with the method of preparing this record. (100 marks)



these mean trouble...

IT MIGHT BE a broken belt, a torn sieve, or a choke-up somewhere in the spouting.

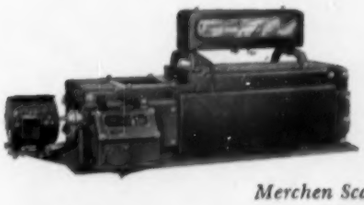
But... no matter *what* causes the flow variation in the flour stream ... it's spotted the INSTANT it happens. One look at the graphic recorder operated from the W&T Massometer or Merchen Scale Meter tells the story. Even the smallest momentary fluctuations in flow rate are detected immediately and recorded accurately by these mill "watch dogs."

W&T Massometers and Merchen Scale Meters provide a continuous record – *by weight* – of actual mill performance. They tell you the *exact* flow rate of your streams and they pinpoint time and production losses.

Guaranteed to 1% accuracy, the Massometer will handle flour flows up to 200 pounds per minute... the Merchen Scale Meter, up to 600 pounds per minute. For other applications the Meter will handle flows up to 3000 pounds per minute. Both instruments have been tested and proved highly dependable in hundreds of installations throughout the country.

For complete information, write us today or communicate with your nearest W&T representative.

Massometer



Merchen Scale Meter

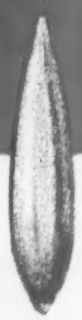
WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

8-19

Because various grains differ in length

You can make exact separations



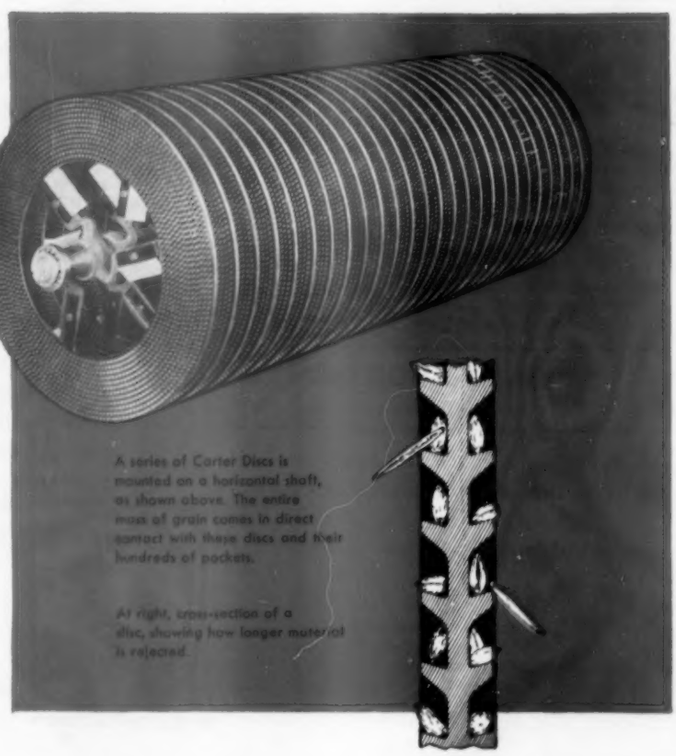
SOME GRAIN IS LONG

SOME IS MEDIUM

SOME IS SHORT

MANY grains are almost identical in width or thickness and would be difficult to separate if it were not for marked differences in their *lengths*. Oats, for example, are longer than wheat; cockle, on the other hand, is shorter than wheat. Because of these length differences, the Carter Disc Separator can make *exact* separations. By means of Carter Discs, which contain hundreds of undercut pockets, the grains or seeds are selected or rejected according to length. As the discs revolve through the grain or mixture, the pockets lift out the material they are designed to carry, and positively reject anything longer.

Take advantage of this accurate method of length separation. Install Carter Disc Separators now!



A series of Carter Discs is mounted on a horizontal shaft, as shown above. The entire mass of grain comes in direct contact with these discs and their hundreds of pockets.

At right, cross-section of a disc, showing how longer material is rejected.

CARTER DISC SEPARATOR

HART-CARTER COMPANY

673 Nineteenth Avenue N. E., Minneapolis 18, Minnesota

Engineers and manufacturers of grain cleaning machinery